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(56) Documents Cited

GB 2332044 A **EP 0166534 A1** **EP 0143247 A1**
EP 0126306 A1 **WO 82/03942 A1** **US 5602948 A**

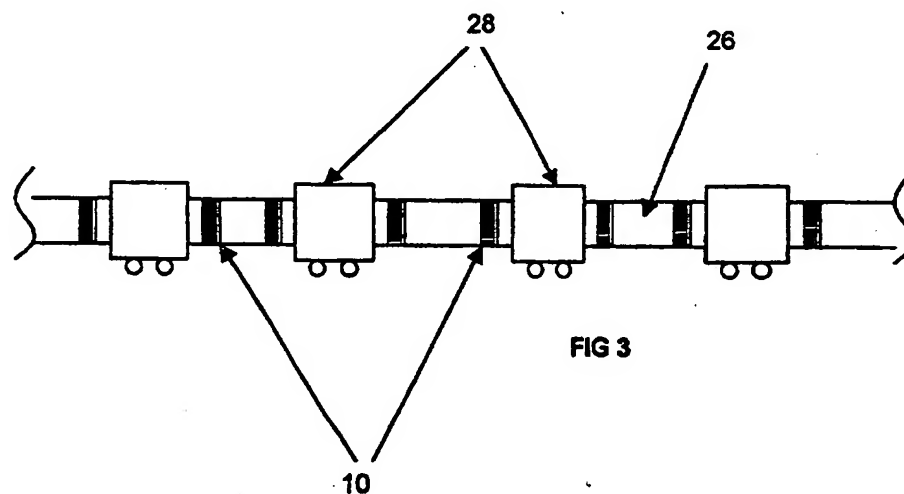
(58) Field of Search

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(54) Abstract Title

Electroluminescent patches

(57) The visibility of a hose or cable 26 is increased by providing a multiplicity of electroluminescent patches 10 at spaced intervals along the hose or cable, and providing a source of power linked to the patches to induce luminescence. Each of the patches may be in the form of a strip or band secured on the hose or cable. The strips or bands are preferably interconnected with rugged cables (14,16; figure 1) via waterproofed connectors (22; figure 2). Power may be supplied to the bands or strips from a battery, and the patches may produce a constant or flashing light. The patches are particularly useful for illuminating refuelling hoses at airports.



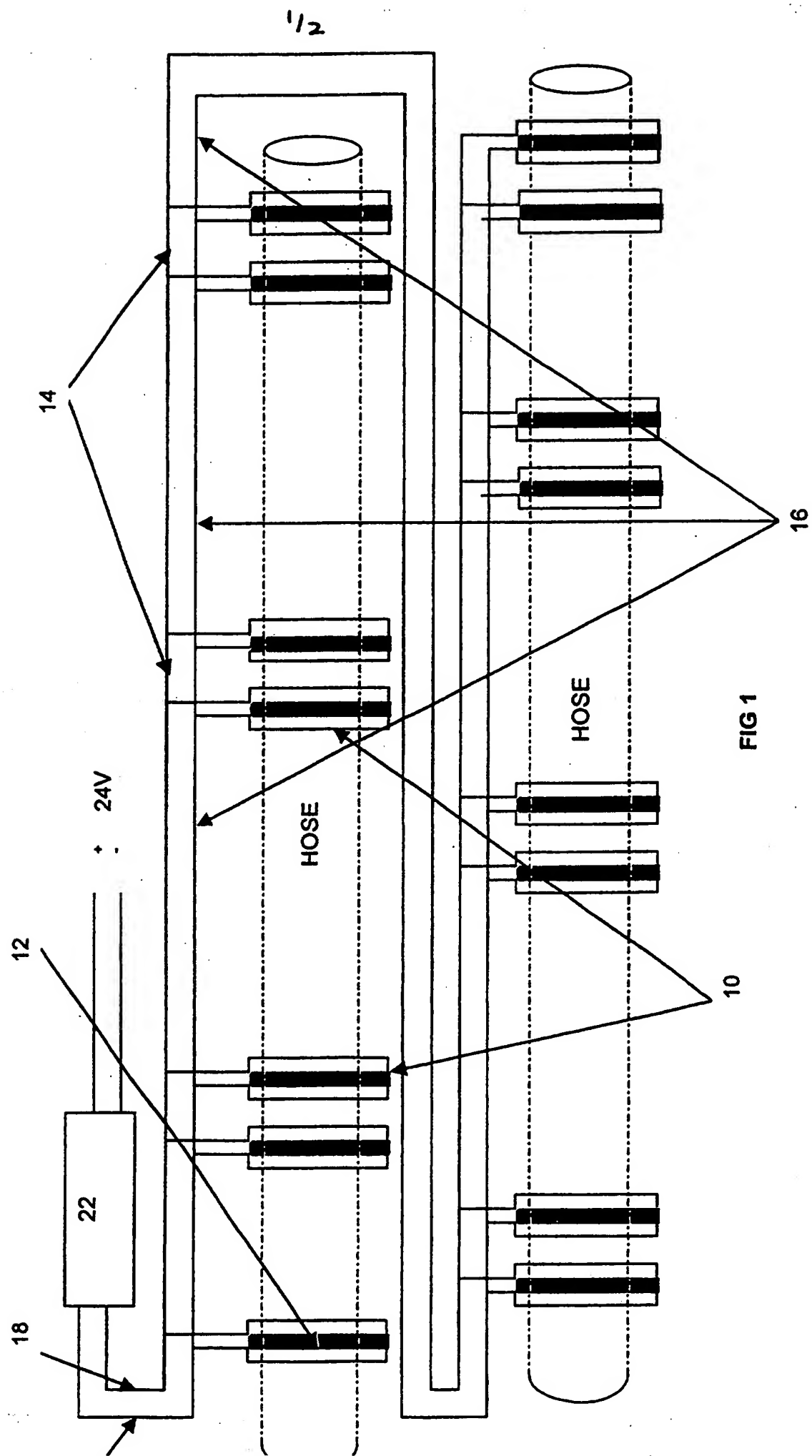
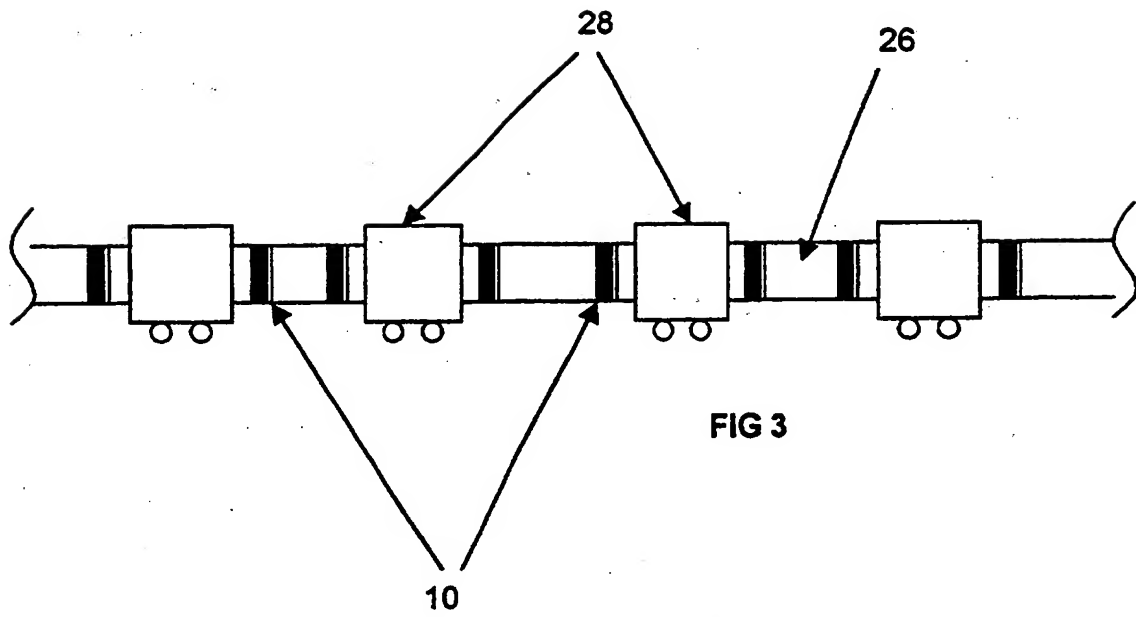
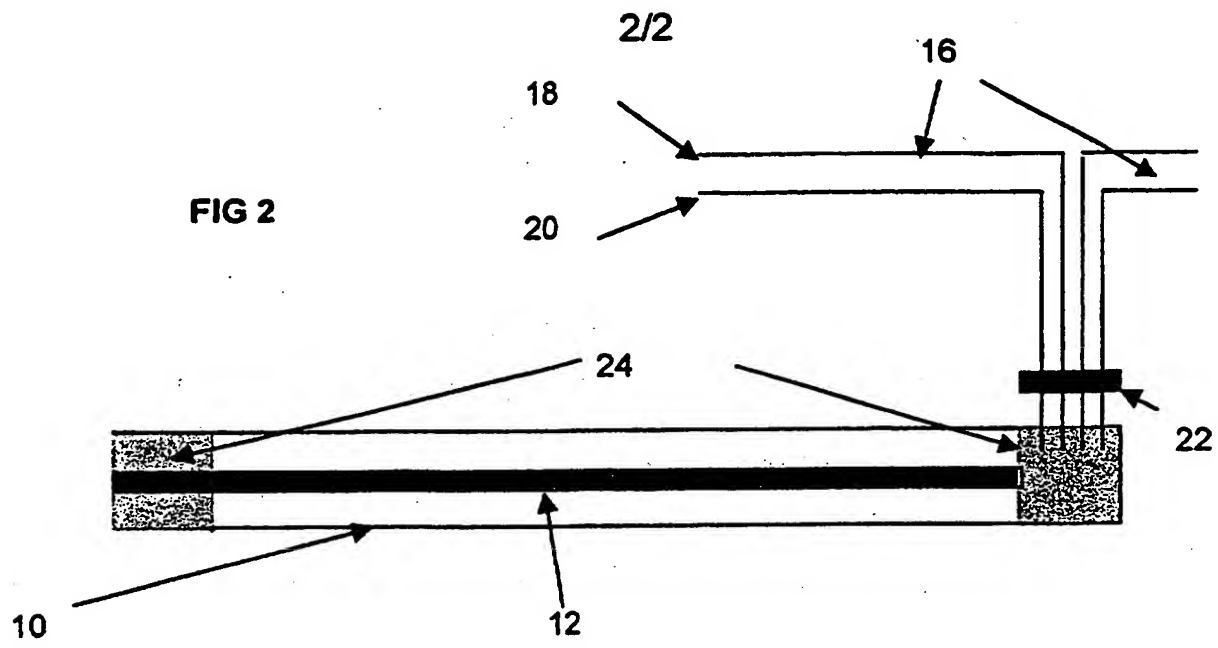


FIG 1



Improvements in or relating to hose or cable visibility.

This invention relates to the improvement of visibility of hoses or cables and
5 more particularly but not solely to the improvement of visibility of hydrant
fuel hoses such as are employed in the refuelling of aircraft.

The refuelling of aircraft at airports is effected by means of a long hose
which is transported to the aircraft by a refuelling vehicle and connected
10 between the aircraft and a fuel hydrant which is connected to a fuel supply
pit from which fuel can be supplied at high pressure. Such hoses are
normally 39 cm. in diameter and present a considerable hazard on the
ground to personnel, who might trip over them, and are also extremely
vulnerable to damage by vehicles running over them. This can result in
15 severing and the release of fuel at high pressure which is extremely
dangerous. Such hoses are heavy and normally have spaced support dollies
which have castors to facilitate movement of the long hose into position for
connection to be made. In order to improve the visibility of such hoses the
dollies can be painted with a bright reflective paint, normally yellow, and/or
20 the hoses can be provided with reflective collars. However, special
difficulties occur at night as such reflective paint or collars require a source
of light in order for them to be seen. This invention has resulted from a
consideration of this problem and enables improved visibility of not only
hoses but also cables.

According to one aspect of the invention there is provided a method of increasing the visibility of a hose or cable, comprising providing the pipe or cable with a multiplicity of electro-luminescent patches at spaced intervals along the hose or cable and providing a source of power linked to the
5 patches to induce luminescence.

According to another aspect of the invention there is provided a visibility enhancing device for a hose or cable, comprising a multiplicity of electro-luminescent patches each linked to an input for a source of power, which
10 patches are adapted for securement to a hose or cable at mutually spaced locations.

According to another aspect of the invention there is provided a hose or cable having a multiplicity of electro-luminescent patches situated at spaced
15 intervals there along which patches are linked to an input for a source of electrical power to induce luminescence.

Each of the patches may be in the form of a strip or band. Each strip or band may be secured, or securable, around a hose or cable by means of a tie.
20 The tie may be in the form of a Velcro (Registered Trade Mark) band or in the case of a luminescent band the ends of the band can be provided with co-operating Velcro ends.

The patches may be connected in parallel across a pair of supply lines
25 coupled to the input or each patch may be linked to the next patch to provide such a parallel connection. The pairs of supply lines or the links

between patches may comprise an expandable cable such as for example a springy coiled cable, similar to that employed in a telephone handset, but preferably armoured. Such an expandable cable permits the spacing between patches to be adjustable along a hose or cable.

5

The visibility enhancing device may comprise a source of power connectable to the input and effective to cause the patches to luminesce. The source of power may comprise an inverter effective to generate a suitable drive voltage when driven from a low voltage d.c. source.

10

In order that the invention and its various other preferred features may be understood more easily, some embodiments thereof will now be described, by way of example only, with reference to the schematic drawings in which:-

15

Figure 1 is a fuel hose visibility enhancement device constructed in accordance with the invention,

20

Figure 2 is an electro-luminescent band suitable for use in the construction of the device of Figure 1 but shown to an enlarged scale and

Figure 3 is a hose provided with visibility enhancement in accordance with the invention.

25

The device of Figure 1 comprises a multiplicity of electro-luminescent bands, in this case fourteen, illustrated as bands 10 for wrapping around a

fuel hose including, when necessary, any associated pipes (for example telemetry). The bands are provided with a luminescent strip 12 formed from a multi-layer semiconductor material. Except for the first band 10 the other bands are grouped in pairs and each pair is linked by expandable coiled cables 14 of length 15 to 25 cm. Each pair is linked to the next pair by expandable coiled cables 16 of 90 to 149 cm. length and the first pair is linked to the first band by a similar length cable 16. The cables need to be rugged so that they can withstand harsh treatment and are preferably armoured. The cables contain two conductors each for connection to different layers of the electro-luminescent strip such that the strips are effectively connected in a parallel configuration and are fed at inputs 18 and 20 from an inverter 22 which converts a 24 volt d.c. supply, from for example the battery of a vehicle, to provide a 400 volt 800 Hz. supply to the electro-luminescent strip 12 to induce luminescence. Alternatively, each band 10 may be powered from its own separate battery and inverter. The inverter may include a pulsing device to enable the strips to be repetitively switched on and off to enhance awareness of the strips and visibility of the hose.

Referring now to figure 2 there is shown a band 10 to an enlarged scale. In order to be suitable for use with a standard hose, of 11.4 cm. diameter (4.5 inch), the band may be of length 46 cm. and provided at opposite ends 24 with 8 cm. of Velcro, one end loop the other end hook, to permit wrapping and securement to the hose by overlapping the Velcro ends. The electro-luminescent strip itself is of length 38 cm. to completely encircle the hose. For illustrative purposes it is the first band which is shown and a cable

16 from the inputs 18 and 20 is shown as is a second cable 16 for connection to the next band of the following pair. The cables are connected by means of weatherproof plug and socket connectors 22. The cables 14 and 16 can alternatively be wired directly to band 10, avoiding the need for connectors. It will be appreciated that the band can be secured around the hose and that in the arrangement of figure 1 the bands can be spaced apart as desired along the hose within the limits defined by the expandability of the cables 14 and 16.

10 Figure 3 shows a hose 26 with spaced supporting dollies 28 and provided with spaced electro-luminescent bands 10. It will be appreciated that it would be possible for a hose to be purpose built with built in spaced electro-luminescent portions or strips linked by external or built in cables. Such a construction is considered to fall within the scope of this invention.

15

Whilst the embodiment described employs bands secured by Velcro. Other forms of fastening could be employed, e.g. ties or press studs, zips or hooks and eyes and the band could be stretchy to enhance securement.

20 Although the embodiment described employs patches in the form of strips of electro-luminescent material for encircling the hose different shapes of patch can be employed e.g. warning symbols, zig zags or letters which luminesce when power is applied. In the case of letters they could be different types arranged so as to spell a warning or other words or word sequences.

25

Instead of employing an expandable cable between electro-luminescent patches a hard wired cable of predetermined length may be employed. The device may be supplied as a kit including cable and connectors

- 5 All of the previously mentioned alternative constructions are considered to fall within the scope of this invention.

The use of electro-luminescent patches is of considerable advantage in that they are robust and free of sources of ignition which latter is of special
10 advantage when used with hoses for flammable liquid, such as aircraft refuelling hoses.

Whilst the invention is of particular advantage in application to hoses and in particular refuelling hoses for aircraft it has application for other purposes
15 e.g. where visibility of hoses or cables needs to be provided on the ground or in suspension in conditions of darkness.

CLAIMS

1. A system of illuminating hoses and cables and thus improving their visibility by employing Electro-luminescent technology.
2. A system as in Claim 1 where increased visibility of a hose or cable is achieved by providing the hose or cable with a multiplicity of flexible Electro-luminescent loops or patches, either continuous or spaced at intervals along the hose or cable and providing a source of power linked to the loops or patches to induce luminescence.
3. A system as claimed in any preceding claim where the Electro-luminescent loops or patches are connected in parallel electrically to a rugged cable harness via waterproofed connectors.
4. A system as claimed in any preceding claim where the interconnecting cable can be expandable, for example a springy coil as in a telephone handset, to adjust the spacing between loops or patches.
5. A system as claimed in any preceding claim where individual sections of the cable or individual Electro-luminescent loops or patches may be replaced without the need to replace the whole assembly.
6. A system as claimed in any preceding claim where the Electro-luminescent loops or patches can be steadily illuminated or caused to flash at pre-determined intervals.
7. A system as claimed in any preceding claim where the drive voltage is derived from an inverter producing an alternating output.
8. A system as claimed in any preceding claim where the power source can be various, including normal mains electricity 240 volts alternating current, a transportable generator delivering either alternating or direct current, 110 volt alternating or direct current supplies or derived from a battery or batteries.
9. A system as claimed in any preceding claim where the Electro-luminescent area, drive voltage and frequency can be adjusted for particular applications.
10. A system as claimed in any preceding claim where the drive current can be precisely controlled (for example not greater than 35 milliamps) to restrict fault spark energies to safe levels.
11. A system as claimed in any preceding claim where the process of producing light is virtually free from heat generation.



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Claims searched: 1-11

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Date of search: 3 March 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): F2P (PA3, PA9, PF14, PF39); F4R (RAG); H1A (AKJ)

Int Cl (Ed.7): F16L 11/12, 57/00; F21L; G08B 5/36, 5/38; H01B 7/36, 13/00, 13/34

Other: Online: WPI, EPODOC, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2332044 A (MINIFLAME) see whole document, especially page 13 lines 17 to 20	1,2,5-11
A	EP 0166534 A1 (INFRATRON)	
Y	EP 0143247 A1 (CONTINENTAL...) also see WPI Abstract Accession No. 1985-136196 [25]	1,2,5-11
Y	EP 0126306 A1 (CONTINENTAL...) also see WPI Abstract Accession No. 1984-295793 [48]	1,2,5-11
Y	WO 82/03942 A1 (ANACONDA-ERICSSON) see whole document	1,2,5-11
X	US 5602948 (CURRIE) see especially figure 1, column 3 lines 63 to 67, column 4 lines 6 to 9 and column 5 lines 44 to 56	1,8,11

X Document indicating lack of novelty or inventive step
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